

The Bitcoin Law in El Salvador: A comprehensive analysis of its design, implementation and socioeconomic impact

La Ley Bitcoin en El Salvador: un análisis integral sobre su diseño, implementación e impacto socioeconómico

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Abstract

The adoption of cryptocurrencies as a financial and economic tool in El Salvador marked an innovative milestone in Latin America, highlighting the country as a pioneer in financial advancement. However, since its implementation in 2021, the Bitcoin Law has generated debates about its economic and social implications. Therefore, the objective of this research was to analyze the Bitcoin Law in El Salvador from its design, implementation, and socioeconomic impact. To achieve this, a systematic review was conducted following the guidelines of the PRISMA method, which included 40 publications analyzed from a quantitative and qualitative perspective. This analysis was based on legal, economic, social, technological, and innovation postulates. In this context, the study revealed that the Bitcoin Law requires a legal framework that harmonizes financial innovation with the prevention of illicit practices related to cryptocurrencies. From an economic perspective, the law provides significant benefits in modernizing and reducing remittance costs. However, to optimize its impact, it is essential to implement financial education programs that promote the responsible use of these cryptocurrencies. Furthermore, the government must prioritize addressing the environmental impact of mining and developing sustainable solutions.

Keywords: Bitcoin, cryptocurrencies, regulations, systematic review.

Resumen

La adopción de criptomonedas como herramienta financiera y económica en El Salvador marcó un hito innovador en Latinoamérica, destacando al país como pionero en avance financiero. Sin embargo, desde su implementación en 2021, la Ley Bitcoin ha generado debates sobre sus implicaciones económicas y sociales. Por ello, el objetivo de esta investigación fue analizar la Ley Bitcoin en El Salvador desde su diseño, implementación e impacto socioeconómico. Para lograrlo, se llevó a cabo una revisión sistemática siguiendo los lineamientos del método PRISMA, que abarcó 40 publicaciones analizadas desde una perspectiva cuanti-cualitativa. Este análisis se basó en postulados jurídicos, económicos, sociales, tecnológicos y de innovación. En este contexto, el estudio reveló que la Ley Bitcoin necesita un marco jurídico que armonice la innovación financiera con la prevención de prácticas ilícitas relacionadas con las criptomonedas. Desde una perspectiva económica, la ley aporta beneficios significativos en la modernización y reducción de costos en remesas. Sin embargo, para optimizar su impacto, es fundamental implementar programas de educación financiera que promuevan el uso responsable de estas criptomonedas. Además, el gobierno debe priorizar el abordaje del impacto ambiental de la minería y desarrollar soluciones sostenibles.

Palabras clave: Bitcoin, criptomonedas, regulaciones, revisión sistemática.

Introduction

The Bitcoin Law in El Salvador represents a milestone in global economic history by making Bitcoin legal tender (Chéreau, 2023). This regulatory framework, approved in June 2021, aimed to reduce dependence on the U.S. dollar, attract foreign investors, and improve the economy, according to Maghfiroh et al. (2023). This monetary experiment, as noted by Murakami & Viswanath-Natraj (2021), increased financial inclusion at the cost of a volatile means of exchange.

The design of the law was based on the premise that the use of cryptocurrencies can offer solutions to structural problems by promoting the region's economic development (Kshetri & Kshetri, 2022). However, the limited supply of Bitcoin and its speculative nature hinder its ability to function as fiat currency, raising challenges for its wider adoption as state money (Golacik, 2024).

In this context, the adoption of Bitcoin as legal tender in El Salvador has sparked intense debate regarding its implications for the national economy and the daily lives of Salvadorans. The adoption of a new currency, such as Bitcoin, also impacts various additional factors, including per capita Gross Domestic Product, trade freedom, internet penetration, and other socioeconomic factors (Parino et al., 2018). According to Gorjón (2021), by becoming the first country to adopt Bitcoin as legal tender, El Salvador faces significant risks for both its economy and financial sector.

Furthermore, a report by Oxford Analytica (2021) indicates that the implementation of the Bitcoin Law jeopardizes economic stability, purchasing power, economic infrastructure, and internet access. In this regard, Alvarez et al. (2022) conclude that the adoption of Bitcoin in El Salvador is limited by concerns about privacy and security, resulting in its use by only a small group of young men educated in cryptocurrency matters.

On the other hand, the law has also been criticized for its potential to facilitate illegal activities, such as money laundering, due to the decentralized and anonymous nature of cryptocurrencies. In this sense, Kostyuchenko & Hrytsenko (2022) warn that the adoption of Bitcoin as official currency may improve the investment climate, payment speed, and banking access, but accounting issues remain unresolved. Following this line of thought, Patel (2024) asserts that the adoption of Bitcoin in El Salvador has shown limited benefits for businesses and has had uneven and neocolonial impacts on the local population, land, and power.

The reality is that as El Salvador becomes a laboratory for financial innovation, it is crucial to evaluate both the benefits and challenges that may arise on the path toward a more digitized economy. Therefore, this article aims to provide a comprehensive analysis of the Bitcoin Law in El Salvador through an examination of its design, implementation, and socioeconomic impact from a multidimensional perspective.

Methodology

Study design

This study conducted a systematic review following the guidelines and standards of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method. Consequently, the focus of the analysis was on the study of existing scientific production concerning the Bitcoin Law in El Salvador. Based on the stated objective, we aimed to identify and evaluate the emerging thematic lines in the selected articles that address the design, implementation, and socioeconomic impact of this law.

Information gathering strategy

Information was collected from major academic databases, such as Scopus, Web of Science, and Google Scholar. A bibliographic search equation was designed and applied to identify and select relevant documents. This equation was based on key terms and Boolean operators to ensure the accuracy and relevance of the results obtained: (TITLE-ABS-KEY (bitcoin) AND (TITLE-ABS-KEY (laws AND legislation) OR TITLE-ABS-KEY (regulation))) AND PUBYEAR > 2021 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (OA, "all") OR (LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI"))).

Additionally, to ensure adequate and exhaustive information gathering, the authors established inclusion and exclusion criteria, which are detailed in the following table:

Table 1

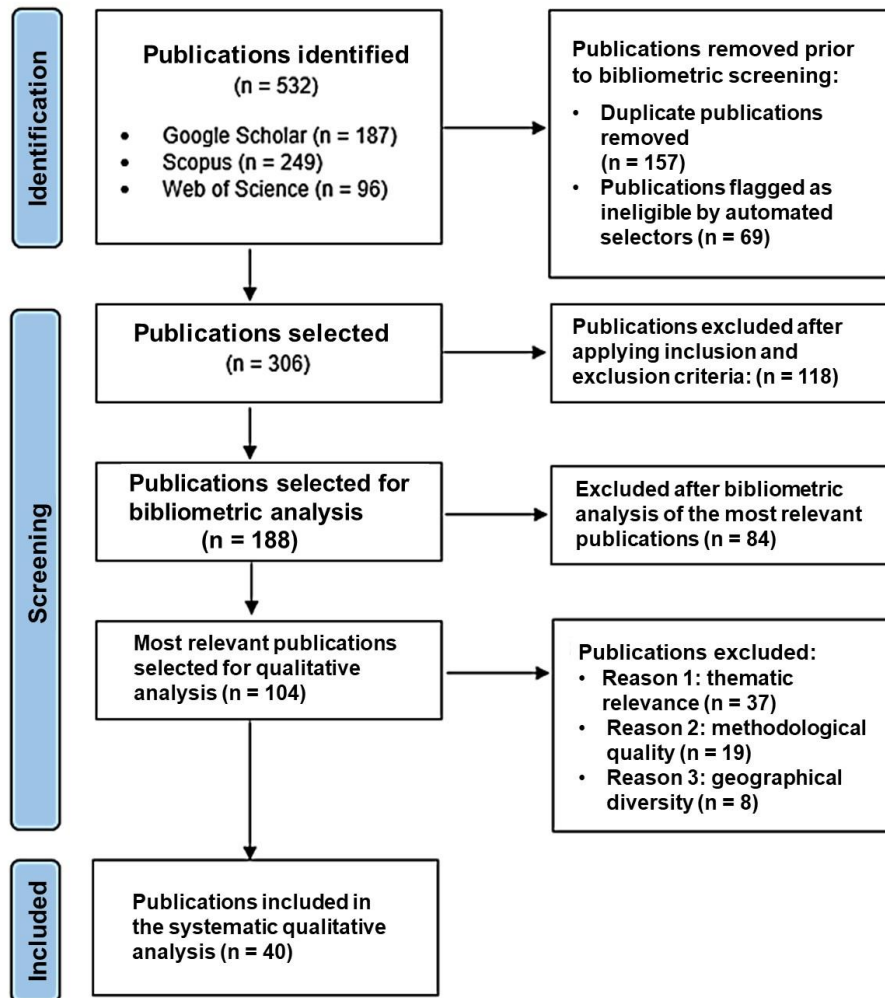
Inclusion and exclusion criteria employed

Inclusion criteria	Exclusion criteria
Research directly addressing the Bitcoin Law, its design, implementation, and impact on the legal, economic, social, and technological dimensions.	Opinion articles, blogs, social media posts, and other documents not peer-reviewed or from unrecognized academic sources will be excluded.
Articles from academic journals, research reports, and theses that have undergone peer review will be considered.	Studies that do not directly address the Bitcoin Law or focus on aspects that do not contribute to understanding its impact in El Salvador will be discarded.
Texts published in both Spanish and English from the law's approval in June 2021 to the review date in 2024 will be included.	Texts published before the law's approval will be excluded as they do not reflect the current research context.
Studies utilizing qualitative, quantitative, or mixed methods focusing on the aforementioned dimensions will be included.	Duplicate texts appearing in the consulted databases will be removed to ensure the integrity of the review.

Study selection

The study selection process for this systematic review was based on the flow diagram recommended by PRISMA guidelines (see Figure 1), which provides a clear framework for documenting each stage of the selection process (Page et al., 2020, 2021). Selection was based on the previously established inclusion and exclusion criteria.

Figure 1
PRISMA Flow Diagram



Source. Authors' own elaboration based on Page et al. (2020, 2021)

As shown in Figure 1, an exhaustive search was initially conducted in the selected databases: Google Scholar, Scopus, and Web of Science. This search identified a total of 532 studies. Subsequently, EndNote software was used to manage references, eliminate duplicates, and remove publications marked as unreadable by automated selectors. After removing duplicates, 306 studies remained.

Afterwards, the established inclusion and exclusion criteria were applied to the quantitative analysis, resulting in the elimination of 118 texts. The titles and abstracts of the remaining 188 studies were then reviewed to determine their relevance concerning the objectives of the bibliometric analysis. For the qualitative phase, the 104 most relevant studies were selected through thematic content units. Finally, after excluding 37 studies for thematic irrelevance, 19 for low methodological quality, and 8 for geographic diversity, 40 studies were selected for systematic qualitative analysis.

Information analysis procedures

For the bibliometric content analysis, Bibliometrix software was utilized. This tool was essential for conducting a quantitative analysis of the reviewed literature, facilitating the identification of trends, patterns, and relationships among the included studies (Moral-Muñoz et al., 2020). For research purposes, the authors focused Ultreras-Rodríguez, A., Tostado-Ramírez, M., De La Paz-Rosales, M., & Bueno-Fernández, M. (2026). The Bitcoin Law in El Salvador: A comprehensive analysis of its design, implementation and socioeconomic impact. *Revista InveCom*, 6 (1), 1-11. <https://zenodo.org/records/15232884>

this analysis on four key dimensions: legal, economic, social, and technology and innovation. Additionally, annual frequency analyses of scientific production, co-occurrence networks of themes, and clusters by thematic mapping were employed.

This bibliometric analysis was complemented by a qualitative analysis of the research trends identified in the quantitative processing. This qualitative process involved coding and categorizing content units, following the steps proposed by Braun & Clarke (2006). It included revisiting the original data to verify that the themes adequately captured the essence of the information, ensuring a deep and accurate understanding of the results.

Ethical considerations

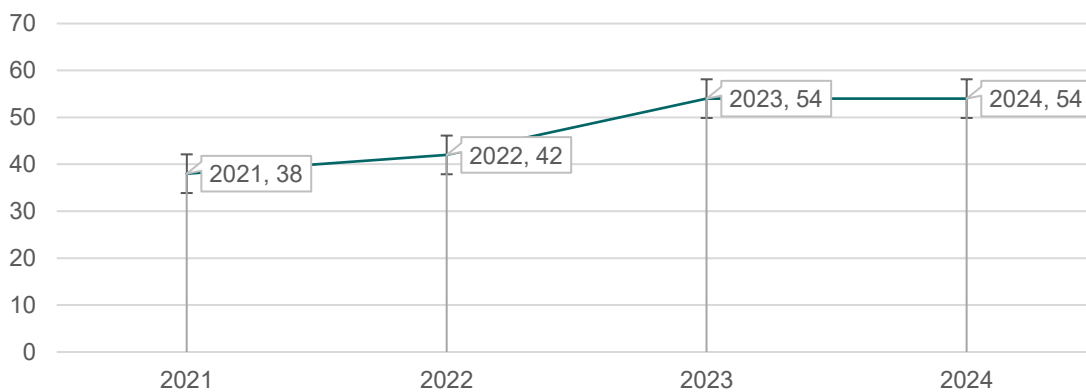
As part of the ethical considerations, special attention was given to appropriately credit all authors and sources of information studied in this research. Furthermore, as part of the authors' strategy, an impartial approach was maintained in the selection and interpretation of the data provided by the literature.

Results and discussion

Between 2021 and 2024, a total of 188 studies related to the Bitcoin Law were published. Since its implementation in 2021, there has been an exponential increase in research related to this topic, with a plateau of 54 articles in 2023 and 2024 (see Figure 2).

Figure 2

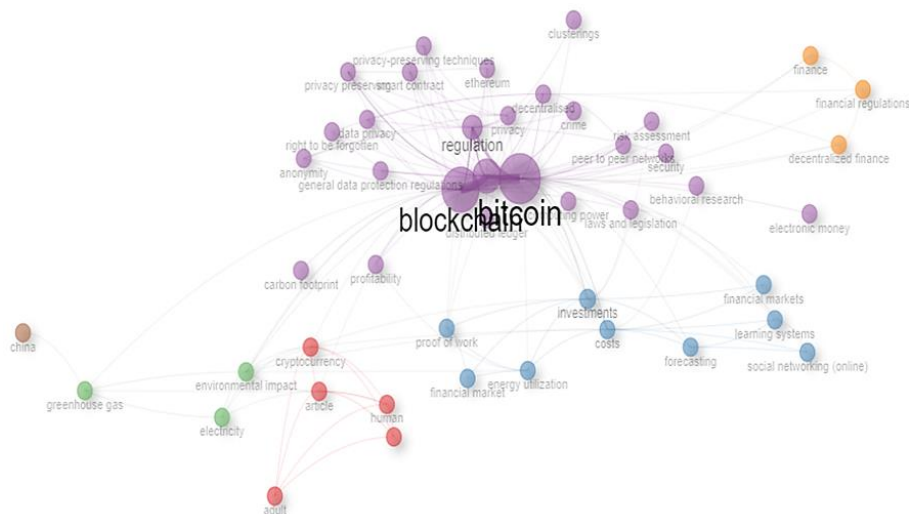
Annual production of research on the topic



Source. Authors' own elaboration based on Bibliometrix data

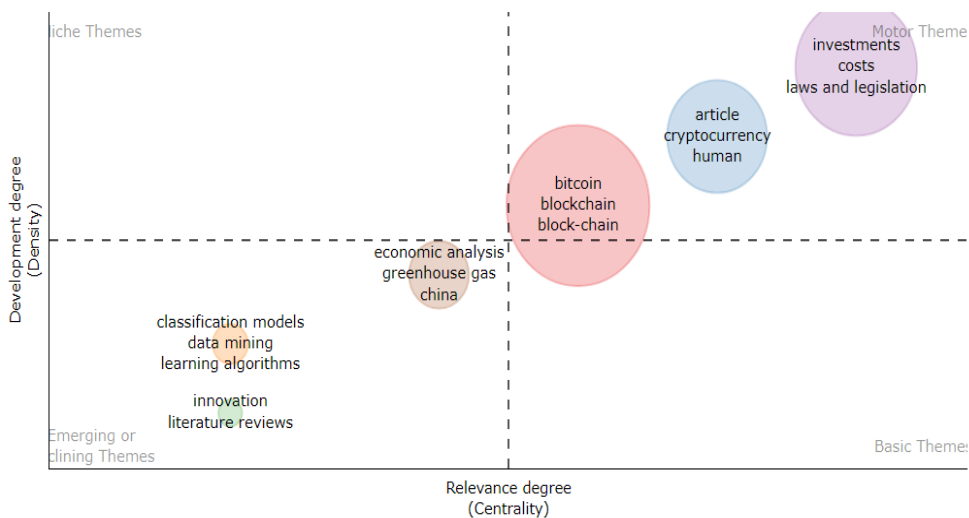
The study of the keyword co-occurrence network revealed five evident semantic networks, visualized according to their color distribution (see Figure 3). To detail the interactions among these semantic networks and their main thematic axes, a thematic map of this data was created (see Figure 4). This approach allowed for better visualization and understanding of relationships among key concepts in the field of study.

Figure 3
Co-occurrence network of themes



Source. Authors' own elaboration based on Bibliometrix data

Figure 4
Thematic map of research trends



Source. Authors' own elaboration based on Bibliometrix data

Through the map, it is observed that the largest semantic network centers around Blockchain, the underlying technology that enables the functioning of Bitcoin and other cryptocurrencies. According to Systems (2022), this technology facilitates the creation of autonomous, secure, reliable, and decentralized ecosystems, particularly useful for optimizing the use of existing devices, infrastructure, and resources. Furthermore, Cahyadi et al. (2021) highlight that Blockchain allows cryptocurrencies to operate without a central authority, reducing risk and transaction costs.

The second largest semantic network focuses on the interactions of investment, costs, laws, and Bitcoin legislations. The literature suggests that adopting specific legislation for Bitcoin, which recognizes and regulates associated risks, can enhance its stability, reduce volatility, and increase trust among investors and digital users (McCall, 2022; Uyumaz & Woldemaryam, 2023).

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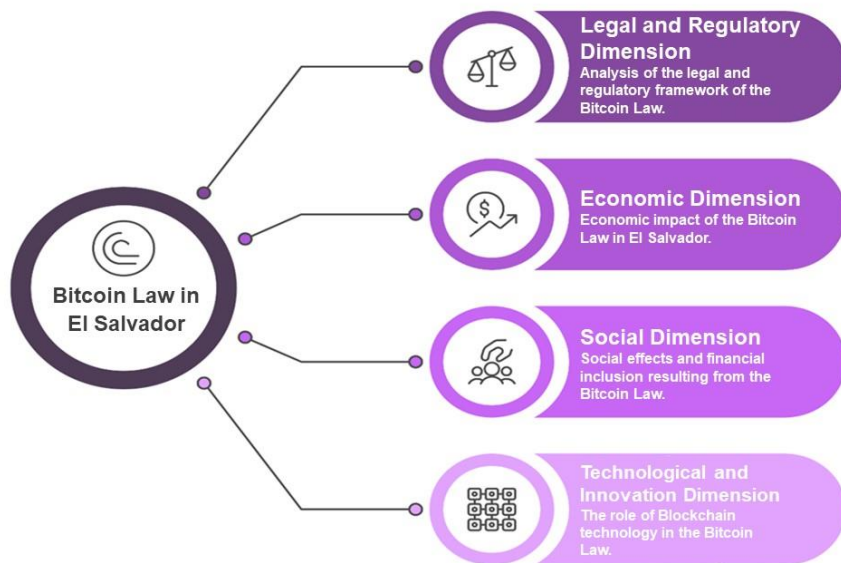
The third semantic network explores the relationship between cryptocurrencies and their application in society. Mora et al. (2021) argue that these can enhance community development among small businesses, indirectly improving quality of life and supporting the achievement of sustainable development goals.

The fourth semantic network analyzes the relationship between cryptocurrency use and its economic impact from an environmental conservation perspective. Although less extensive than the previous ones, it is concerning on an international level. According to Bajra et al. (2024), cryptocurrencies based on Proof of Work, like Bitcoin, generate approximately 0.86 metric tons of carbon emissions per transaction. Bitcoin consumes large amounts of energy, potentially contributing to climate change (Mohsin, 2021).

The fifth semantic network examines how data mining and machine learning algorithms optimize processes in the use of cryptocurrencies like Bitcoin. Sebastião & Godinho (2021) note that machine learning techniques can effectively predict cryptocurrencies and design profitable business strategies, even in adverse market conditions.

For the qualitative analysis of these emerging semantic networks from the bibliometric analysis, the authors focused on four dimensions of analysis (see Figure 5), considered the main angles for addressing the phenomenon.

Figure 5
Analysis dimensions of the Bitcoin Law in El Salvador



Source. Authors' own elaboration

Legal and Regulatory Dimension

One of the central themes in this dimension is the regulation of cryptocurrencies. The identified semantic networks highlight the need for legal frameworks that promote financial innovation and mitigate risks associated with illicit activities (Náñez Alonso et al., 2024). On one hand, Fletcher et al. (2021) warn that characteristics like the peer-to-peer system and the pseudonymity of Bitcoin have turned it into a vehicle for financing terrorism and money laundering. Anggriawan & Susila (2024) add that its decentralized nature complicates the confiscation of funds linked to transnational crimes, requiring greater international cooperation and agile information exchange systems.

On the other hand, the semantic networks emphasize that legal certainty is fundamental for generating trust among investors and users, a condition essential for the widespread adoption of Bitcoin. In this regard, findings align with Uyumaz & Woldemaryam (2023), who argue that specific legislation—regulating risks and

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recognizing its legal status—could reduce volatility and stabilize its value, attracting greater participation in the digital ecosystem.

The reviewed literature also stresses that cryptocurrencies must adapt to traditional financial regulations to correct market failures and negative externalities (Arner et al., 2024). This approach, according to the authors, would facilitate El Salvador's integration into the global cryptocurrency market.

Economic Dimension

From an economic perspective, research on the adoption of Bitcoin in El Salvador focuses on assessing its impact on the national economy both in the short and long term. According to Vázquez (2022), President Nayib Bukele's statement that the adoption of Bitcoin would foster capital flows into the economy reflects a belief that this cryptocurrency could be the future of money. However, Bitcoin's limited supply and speculative nature hinder its ability to function as fiat currency, particularly in managing aggregate demand and economic crises, as noted by Golacik (2024). Specifically, Murakami & Viswanath-Natraj (2021) predict that a significant drop in Bitcoin's price could lead to a decline in the country's production and consumption by approximately 1%.

Additionally, the relationship between cryptocurrency use and its economic impact is investigated in terms of market volatility. In this context, the literature suggests that the stability of cryptocurrency returns increases when political uncertainty is higher. However, Zhang et al. (2024) indicate that investors perceive liquidity volatility as a significant risk, and cryptocurrencies may cease to be a safe haven in contexts of high economic uncertainty. On the other hand, Bibi (2023) highlights that the evolution of Bitcoin has challenged traditional central bank money, prompting them to consider their own digital currencies. Moreover, El Salvador's Bitcoin Law has provided financial incentives to attract foreign capital and export-oriented manufacturing (Watts, 2023).

An emerging aspect in the economic analysis is the environmental impact derived from Bitcoin use. According to Chamanara et al. (2023), Bitcoin mining consumed 173.42 TWh of electricity and emitted 85.89 Mt of CO₂eq during the 2020-2021 period, equivalent to the emissions caused by burning 84 billion pounds of coal or the operation of 190 natural gas power plants. Sapro & Shaikh (2023) conclude that the increasing cryptocurrency market index and its associated prices elevate Bitcoin-specific electricity consumption and carbon emissions.

Social Dimension

In the social dimension, research on the Bitcoin Law in El Salvador focuses on understanding how the population perceives this financial innovation. A prominent assertion in this dimension is that cryptocurrencies have potential as legal tender and investment assets. However, as Wanyi & Megargel (2023) point out, their future depends on individual consumer interest and government support.

In this context, the adoption of Bitcoin in El Salvador is driven by economic development and the desire to diversify its currency (Kshetri & Kshetri, 2022). However, according to Vázquez (2022), this adoption could merely serve as a pretext to pursue the class interests of El Salvador's new oligarchy, rather than being a genuine economic solution for the country.

Therefore, the Bitcoin experiment in El Salvador faces serious challenges. These include low access to digital finance, concerns over financial crimes, and the need to upgrade information technology infrastructure for businesses accepting Bitcoin (Oxford Analytica, 2021). Additionally, the limited supply of Bitcoin and its speculative nature hinder its ability to function as fiat currency, posing challenges for its broader adoption as state money (Golacik, 2024).

Technological and Innovation Dimension

In the technological and innovation realm, research on the Bitcoin Law in El Salvador focuses on emerging technologies. From this perspective, Jin (2024) highlights that machine learning technologies enhance efficiency, smart contracts, and transaction monitoring, protecting user privacy and improving data security in Bitcoin. Additionally, machine learning algorithms, such as Random Forest and Deep Learning, can accurately predict Bitcoin prices, which, according to Nataraj et al. (2023), helps investors make informed decisions and optimize their investments.

Furthermore, Blockchain technology, as previously mentioned, ensures that cryptocurrency transactions are more secure and tamper-proof (Lakshmi et al., 2024). Priyanka & Makani (2024) note that this technology helps resolve issues related to security, transparency, trust, and the reliability of knowledge processing in businesses and organizations.

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The identified semantic networks also underscore the importance of technological innovation in addressing the environmental challenges associated with cryptocurrency mining. For instance, synergies between green hydrogen technologies and Bitcoin mining operations can enhance the deployment of renewable energies and climate sustainability, with potential for carbon offsetting and climate resilience, according to Lal & You (2024).

This is particularly necessary in the current landscape, as cryptocurrency mining, particularly Bitcoin, requires a significant amount of electricity, which, as Winotoatmojo et al. (2024) warn, generates a substantial carbon footprint and environmental repercussions. Bitcoin mining poses significant risks to the environment and health, leading Tayebi & Amini (2024) to emphasize the need for global regulation and a transition toward more sustainable consensus mechanisms, such as Proof of Stake.

Conclusions

The Bitcoin Law in El Salvador represents a historic milestone in the Latin American and international context by adopting cryptocurrencies, specifically Bitcoin, as legal tender. This research has addressed the intense and multifaceted debate generated around this phenomenon since its approval in 2021, analyzing the available scientific data. The identified semantic networks focus on five key content axes: blockchain, investment and cost interactions, the relationship between cryptocurrencies and society, economic and environmental impact, and process optimization through data mining and machine learning. These axes are interrelated from an analytical perspective that encompasses legal, social, economic, and technological viewpoints.

However, despite the potential benefits this law offers, significant challenges remain that require a comprehensive approach combining these dimensions to achieve favorable outcomes for society. Therefore, it is crucial for El Salvador to continue adjusting its policies and promote collaboration among the government, the private sector, and civil society. In this way, current obstacles can be overcome, ensuring that this initiative is sustainable and beneficial in the long term.

References

- Álvarez, F., Argente, D., & Van Patten, D. (2022). Are cryptocurrencies currencies? Bitcoin as legal tender in El Salvador. *Science*, 382. <https://doi.org/10.1126/science.add2844>
- Anggriawan, R., & Susila, M. (2024). Cryptocurrency and its nexus with money laundering and terrorism financing within the framework of FATF recommendations. *Novum Jus*. <https://doi.org/10.14718/novumjus.2024.18.2.10>
- Arner, D., Zetzsche, D., Buckley, R., & Kirkwood, J. (2024). The financialisation of Crypto: Designing an international regulatory consensus. *Comput. Law Secur. Rev.*, 53, 105970. <https://doi.org/10.1016/j.clsr.2024.105970>
- Bibi, S. (2023). Money in the time of crypto. *Research in International Business and Finance*, 65, 101964. <https://doi.org/10.1016/j.ribaf.2023.101964>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 101 - 77. <https://doi.org/10.1191/1478088706qp063oa>
- Cahyadi, F., Owen, A., Ricardo, F., & Gunawan, A. (2021). Blockchain technology behind cryptocurrency and Bitcoin for commercial transactions. *2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI)*, 1, 115-119. <https://doi.org/10.1109/ICCSAI53272.2021.9609790>
- Chamanara, S., Ghaffarizadeh, S., & Madani, K. (2023). The environmental footprint of Bitcoin mining across the globe: call for urgent action. *Earth's Future*, 11. <https://doi.org/10.1029/2023EF003871>
- Chéreau, E. (2023). Interdependencia y vulnerabilidad en la era de Bitcoin: El caso de El Salvador. Universidad Nacional de General San Martín. https://repositoriosdigitales.mincyt.gob.ar/vufind/Record/RIUNSAM_3abd6e19745c9119910b5683d3334765
- Fletcher, E., Larkin, C., & Corbet, S. (2021). Countering money laundering and terrorist financing: A case for Bitcoin regulation. *Research in International Business and Finance*, 56, 101387. <https://doi.org/10.1016/J.RIBAF.2021.101387>
- Golacik, K. (2024). Bitcoin: an alternative to fiat money? A post-Keynesian perspective. *Catallaxy*. <https://doi.org/10.24136/cxy.2024.002>
- Gorjon, S. (2021). The role of cryptoassets as legal tender: the example of El Salvador. *Banco de España: Eurosistema*, 35(21). <https://ssrn.com/abstract=3944765>

Ultreras-Rodríguez, A., Tostado-Ramírez, M., De La Paz-Rosales, M., & Bueno-Fernández, M. (2026). The Bitcoin Law in El Salvador: A comprehensive analysis of its design, implementation and socioeconomic impact. *Revista InveCom*, 6 (1), 1-11. <https://zenodo.org/records/15232884>

- Jin, Z. (2024). An analysis on the application of machine learning in Bitcoin. *Science and Technology of Engineering, Chemistry and Environmental Protection*. <https://doi.org/10.61173/hn9hgw08>
- Kostyuchenko, V., & Hrytsenko, V. (2022). Preconditions for cryptocurrency accounting as the official state currency. *Modern Economic*. [https://doi.org/10.31521/modecon.v35\(2022\)-11](https://doi.org/10.31521/modecon.v35(2022)-11)
- Kshetri, N., & Kshetri, N. (2022). Bitcoin's adoption as legal tender: a tale of two developing countries. *IT Professional*, 24, 12-15. <https://doi.org/10.1109/MITP.2022.3205528>
- Lakshmi, Y., Raj, Y., Chowdary, U., Ratna, O., Harini, M., & Edamadaka, D. (2024). Bitcoin in blockchain technology and ethereum in smart contracts. *International Journal for Research in Applied Science and Engineering Technology*. <https://doi.org/10.22214/ijraset.2024.56064>
- Lal, A., & You, F. (2024). Climate sustainability through a dynamic duo: Green hydrogen and crypto driving energy transition and decarbonization. *Proceedings of the National Academy of Sciences of the United States of America*, 121. <https://doi.org/10.1073/pnas.2313911121>
- Lirih Hayyu Maghfiroh, Sri Yuniati, & Adhiningasih Prabhawati. (2023). Analysis of bitcoin legalization as an official transaction tool in El Salvador. *Sosioedukasi: Jurnal Ilmiah Ilmu Pendidikan Dan Sosial*, 12(1), 128-133. <https://doi.org/10.36526/sosioedukasi.v12i1.2701>
- McCall, B. (2022). How El Salvador has changed U.S. law by a bit: the consequences for the UCC of Bitcoin becoming legal tender. *Oklahoma Law Review*, 74(3), 313-335. <https://ssrn.com/abstract=4124510>
- Mohsin, K. (2021). Cryptocurrency & its impact on environment. *CompSciRN: Other Cybersecurity*. <https://doi.org/10.2139/ssrn.3846774>
- Mora, H., Morales-Morales, M., López, F., & Mollá-Sirvent, R. (2021). Social cryptocurrencies as model for enhancing sustainable development. *Kybernetes*, 50, 2883-2916. <https://doi.org/10.1108/K-05-2020-0259>
- Moral-Munoz, J., Herrera-Viedma, E., Santisteban-Espejo, A., & Cobo, M. (2020). Software tools for conducting bibliometric analysis in science: An up-to-date review. *El Profesional de la Información*. <https://doi.org/10.3145/epi.2020.ene.03>
- Murakami, D., & Viswanath-Natraj, G. (2021). Cryptocurrencies in emerging markets: a stablecoin solution? *International Political Economy: Monetary Relations eJournal*. <https://doi.org/10.2139/ssrn.3949012>
- Náñez Alonso, S., Echarte Fernández, M., Sans Bas, D., & Pérez Rico, C. (2024). El Salvador: an analysis of the monetary integration law and the bitcoin law. *Brazilian Journal of Political Economy*, 44(1). <https://doi.org/10.1590/0101-31572024-3459>
- Nataraj, B., Prabha, K., Swetha, V., Sukitha, S., & Yuvashree, C. (2023). Smart Bitcoin alert system. *2023 Third International Conference on Smart Technologies, Communication and Robotics (STCR)*, 1, 1-5. <https://doi.org/10.1109/STCR59085.2023.10396924>
- Oxford Analytica (2021). El Salvador bitcoin experiment comes with risks. *Emerald Expert Briefings*. <https://doi.org/10.1108/oxan-db262686>
- Page, M., McKenzie, J., Bossuyt, P., Boutron, I., Hoffmann, T., Mulrow, C., Shamseer, L., Tetzlaff, J., Akl, E., Brennan, S., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M., Li, T., Loder, E., Mayo-Wilson, E., McDonald, S., McGuinness, L., Stewart, L., Thomas, J., Tricco, A., Welch, V., Whiting, P., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Journal of clinical epidemiology*. <https://doi.org/10.1016/j.jclinepi.2021.03.001>
- Page, M., Moher, D., Bossuyt, P., Boutron, I., Hoffmann, T., Mulrow, C., Shamseer, L., Tetzlaff, J., Akl, E., Brennan, S., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M., Li, T., Loder, E., Mayo-Wilson, E., McDonald, S., McGuinness, L., Stewart, L., Thomas, J., Tricco, A., Welch, V., Whiting, P., & McKenzie, J. (2020). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *The BMJ*, 372. <https://doi.org/10.1136/bmj.n160>
- Parino, F., Beiró, M., & Gauvin, L. (2018). Analysis of the Bitcoin blockchain: socio-economic factors behind the adoption. *EPJ Data Science*, 7. <https://doi.org/10.1140/epjds/s13688-018-0170-8>
- Patel, R. (2024). Economic freedom or crypto-colonialism? Materialities of Bitcoin adoption in El Salvador. *Geoforum*. <https://doi.org/10.1016/j.geoforum.2024.103980>
- Priyanka, P., & Makani, R. (2024). Blockchain technology: cryptocurrency application arena. *Engineering and Technology Journal*. <https://doi.org/10.47191/etj/v9i09.20>
- Sapra, N., & Shaikh, I. (2023). Impact of Bitcoin mining and crypto market determinants on Bitcoin-based energy consumption. *Managerial Finance*. <https://doi.org/10.1108/mf-03-2023-0179>

Ultreras-Rodríguez, A., Tostado-Ramírez, M., De La Paz-Rosales, M., & Bueno-Fernández, M. (2026). The Bitcoin Law in El Salvador: A comprehensive analysis of its design, implementation and socioeconomic impact. *Revista InveCom*, 6 (1), 1-11. <https://zenodo.org/records/15232884>

- Sebastião, H., & Godinho, P. (2021). Forecasting and trading cryptocurrencies with machine learning under changing market conditions. *Financical Innovation*, 7. <https://doi.org/10.1186/s40854-020-00217-x>
- Systems, M. (2022). IEEE transactions on systems, man, and cybernetics: systems. <https://doi.org/10.1109/tsmc.6221021>
- Tayebi, S., & Amini, H. (2024). The flip side of the coin: Exploring the environmental and health impacts of proof-of-work cryptocurrency mining. *Environmental research*, 118798. <https://doi.org/10.1016/j.envres.2024.118798>
- Uyumaz, A., & Woldemaryam, E. (2023). Bitcoin: The nexus between regulation and recognition. *Acta Oeconomica*. <https://doi.org/10.1556/032.2023.00046>
- Vázquez, E. (2022). The technical fix. *South Atlantic Quarterly*. <https://doi.org/10.4135/9781446215159.n833>
- Wanyi, W., & Megargel, A. (2023). The future of cryptocurrency and Blockchain technology in finance. *Journal of Digital Banking*. <https://doi.org/10.69554/kjtm9206>
- Watts, M. (2023). Adventure capitalism: a history of libertarian exit, from the era of decolonization to the digital age. *The AAG Review of Books*, 11, 15 - 19. <https://doi.org/10.1080/2325548X.2023.2176638>
- Winotoatmojo, H., Lazuardy, S., Arland, F., & Setyawan, A. (2024). Environmental impact of cryptocurrency mining: sustainability challenges and solutions. *Journal of Scientech Research and Development*. <https://doi.org/10.56670/jsrd.v6i1.312>
- Zhang, P., Kong, D., Xu, K., & Qi, J. (2024). Global economic policy uncertainty and the stability of cryptocurrency returns: The role of liquidity volatility. *Research in International Business and Finance*. <https://doi.org/10.1016/j.ribaf.2023.102165>

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